ISO-plus-RS4
ISO-plus-CAN

User manual

Table of contents

Introduction

Thanks for choosing is controller.
The ISO-RS4 series integrates in a single device the main elements of the control loop: reading of temperature sensor, control output by SSR module, reading and control of the current on the load by means of integrated current CT. Serial communication RS485 and ModbusRTU or CANopen protocol allow the connection to PC/HMI Panels for supervisory functions/remote control.
This device is provided with alarms functions, management of double action installation and possibility to be used as expansion controlled by PLC.

1 Safety standards

Read carefully the safety guidelines and programming instructions contained in this manual before using/connecting the device.
Disconnect power supply before proceeding to hardware settings or electrical wirings.
Only qualified personnel should be allowed to use the device and/or service it and in accordance to technical data and environmental conditions listed in this manual.
Do not dispose electric tools together with household waste material. In observance European Directive 2002/96/EC on waste electrical and electronic equipment and its implementation in accordance with national law, electric tools that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.

2 Model identification

ISO-plus-RS4	Power supply 24Vdc ±15% + 1 analogue input + 2 logic output 24Vdc/50mA + 1 output 0/4...20mA + RS485 +C.T.
ISO-plus-CAN	Power supply 24Vdc ±15% + 1 analogue input + 2 logic output 24Vdc/50mA + 1 output 0/4...20mA + CANopen +C.T.

3 Technical data

3.1 Main features

Operating temperature	0-45°C, humidity 35..95uR%
Box	DIN43880, 18 x 90 x 64 mm
Material	Box: PC UL94V0 self-extinguishing; front panel: PC UL94V0 self-extinguishing
Protection	IP20 (box and terminal blocks)
Peso	Approx. 30 g

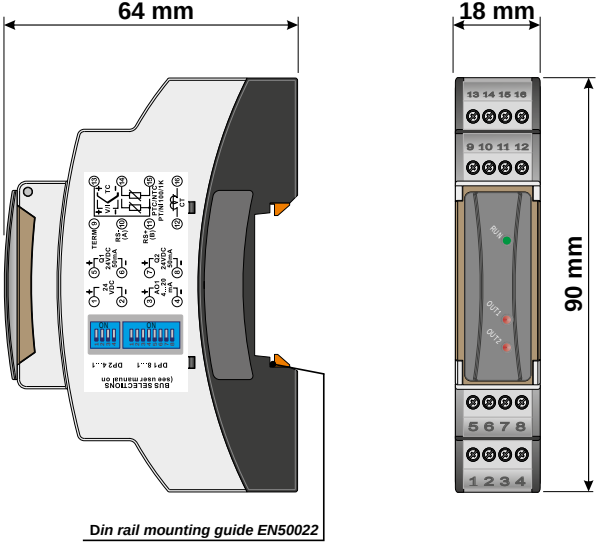
3.2 Hardware Features

Power supply	24 VDC ±15%	Consumption: 3 VA
Analogue input galvanically insulated	**1**: AN1 Configurable via software. **Input**: Thermocouple type K, S, R, J, T, E, N, B. Automatic compensation of cold junction from 0..50°C. **Thermoresistance**: PT100, PT500, PT1000, Ni100, PTC1K, NTC10K (β 3435K). **Input V/I**: 0-10 V, 0-20 or 4-20 mA, 0-60 mV. **Pot. input**: Configurable 1..150kΩ, + 1: C.T. trafo amperimetrico: 50 mAAC 50/60 Hz	Tolerance (25 °C) +/-0.3% ±1 digit (su F.s.) for thermocouple, thermoresistance and V / mA. Cold junction accuracy 0.1 °C/°C **Impedence**: **0-10 V**: Ri>110 kΩ **0-20 mA**: Ri<50 Ω **4-20 mA**: Ri<50 Ω **0-60 mV**: Ri>500 kΩ
Logic output	**2** x SSR. Configurable as command or alarm output	+24VDC ±15%/ 50mA
Analogue output galvanically insulated	**1** x 0/4..20 mA. Configurable as command output, alarm output or retransmission	0..20 mA: 42500 points, ±0.3% on F.S. 4..20 mA 34000 points, ±0.3% on F.S.
Serial output	RS-485 Mod bus. galvanically insulated	

3.3 Software features

Regulation algorithms	ON-OFF with hysteresis. P, PI, PID, PD proportional time.
Proportional band	0..999°C or °F
Integral time	0,0..999,9 s (0 excludes integral function)
Derivative time	0,0..999,9 s (0 excludes derivative function)
Controller functions	Manual or automatic tuning, configurable alarm, Start/Stop.

4 Dimensions and Installation

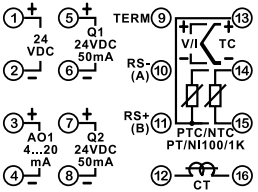


5 Electrical wirings

This controller has been designed and manufactured in conformity to Low Voltage Directive 2006/95/EC , 2014/35/EU (LVD) and EMC Directive 2004/108/EC, 2014/30/EU (EMC). For installation in industrial environments please observe following safety guidelines:

- Separate control line from power wires.
- Avoid proximity of remote control switches, electromagnetic contactors, powerful engines and use specific filters.
- Avoid proximity of power groups, especially those with phase control.
- It is strongly recommended to install adequate mains filter on power supply of the machine where the controller is installed, particularly if supplied 230Vac. The controller is designed and conceived to be incorporated into other machines, therefore CE marking on the controller does not exempt the manufacturer of machines from safety and conformity requirements applying to the machine itself.

5.1 Wiring diagram

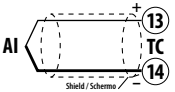


ISO-plus-RS4

5.1.a Power Supply

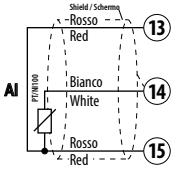
Power supply 24 VDC ±15% – 3 VA

5.1.b Analogue Input



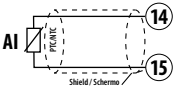
For thermocouples K, S, R, J, T, E, N, B.

- Comply with polarity
- For possible extensions, use compensated cable and terminals suitable for the thermocouples used(compensated)
- When shielded cable is used, it should be grounded at one side only

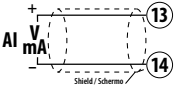


For thermoresistances PT100, Ni100.

- For the three-wire connection use wires with the same section
- For the two-wire connection short-circuit terminals 13 and 15
- When shielded cable is used, it should be grounded at one side only

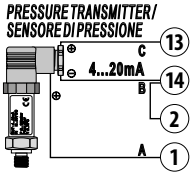


For thermoresistances NTC, PTC, PT500, PT1000 and linear potentiometers
When shielded cable is used, it should be grounded at one side only to avoid ground loop currents



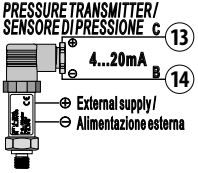
For linear signals in Volt and mA
Comply with polarity
When shielded cable is used, it should be grounded at one side only to avoid ground loop currents

5.1.c Examples of connection for Volt and mA inputs



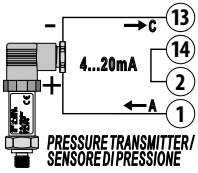
For linear signals 0/4..20 mA with three-wires sensors.
Comply with polarity:
A= Sensor output
B= Sensor ground
C= Sensor supply (24VDC)

Short circuit pins 2 and 14.



For linear signals 0/4..20 mA with external power supply for sensor.

Comply with polarity:
A= Sensor output
B= Sensor ground

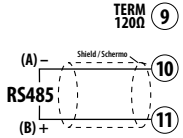


For linear signals 0/4..20 mA with two-wires sensors.

Comply with polarity:
C= Sensor output
A= Sensor supply (24VDC)

Short circuit pins 2 and 14.

5.1.d Serial input



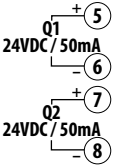
Communication RS485 Modbus RTU Slave galvanically insulated from the sensor.

Short circuit pins 9 and 10 to enter on the bus a 120Ω termination resistance.

5.1.e CT input

Input for CT 50mA.
Sampling time 100 µs.
Current measure true RMS for Heater Break Alarm and overcurrent alarm functions.

5.1.f Digital outputs



Digital output **24VDC** ±15%/ 50mA

5.1.g Analogue output

inear output in mA (galvanically insulated from the sensor) configurable as command (par. 16 c.out) or retransmission of process-setpoint (par. 100 rEtr.)

6 Leds and key function

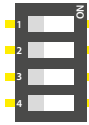
6.1 Meaning of status lights (LED)

RUN ●	Indicates presence of serial communication
OUT1 ●	Normally it indicates the status of output OUT1. • During test (pressing key), if the command output is OUT1, blinks with frequency 50ms. • At the end of current acquisition by the CT, blinks with frequency 0.5s if the operation has been done successfully. • In case of error, it blinks in alternation with the led OUT 2 (ex. broken sensor).
OUT2 ●	Normally indicates the status of output OUT2. • During test (pressing key), if the command output is OUT2, blinks with frequency 50ms. • At the end of current acquisition by the CT, blinks with frequency 0.5s if the operation has been done successfully • In case of error, it blinks in alternation with the led OUT 1 (ex. broken sensor).

6.2 Key

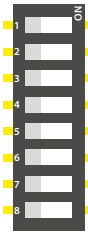
- If pressed it enables the command output: press for more than 3 seconds to manage the threshold current reading for the Heater Break Alarm control.
- If pressed during the modbus address assignment function, it stores the value assigned by the master (only if the dip1 is all in OFF).

6.3 Dip switch



DIP 2 - Baud rate and loading default values

- If contacts 1..3 are OFF, modbus baud rate is selected on parameter 112 bd.rt.
- If contact 4 is ON, parameters and all eeprom datas are loaded with default values (default = 19.200baud , address 247, 8n1).
- Determines modbus baud rate, using following values: 001=4800; 010=9600; 011=19200; 100=28800; 101=38400; 110=57600; 111=115200. (contact 1 = LSB). ex. **baud 4800** = 1(ON) 2,3,4(OFF)



DIP 1 – Slave address

- If contacts 1..8 are OFF, modbus slave address is selected on parameter 111 SL.Ad.
- Determines modbus slave address, in binary code as indicated below: (contact 1 = LSB) ex. **address 1**= 1(0N) 2,3,4,5,6,7,8(0FF) 00000001=1; 00000010=2; 00000011=3; 00000100=4; 00000101=5; 00000110=6; 00000111=7; 01111101=125; 01111110=126; 01111111=127; 10000000=128; 10000001=129; 10000010=130; 11111011=251; 11111100=252; 11111101=253; 11111110=254.

7 Controller functions

7.1 Loading default values

This procedure allows to restore default settings as pre-selected at the factory.
There are two reset modes:

- Close contact 4 of the dip switch 2 and reopen it at restart.
- Write 9999 on word modbus 500.

After the restore, device restarts.

7.2 Controller Start / Stop and setpoint modification

User can decide if at power-on ISO-plus starts regulation or not, setting parameter 17 in it.S. (word 2017). Can modify the controller state writing 1 (start) or 0 (stop) on word 1204. It is possibile also to modify command setpoint writing on word 1201, and alarm setpoints on words 1202 and 1203.

7.3 Automatic tuning

Select 1 on parameter 31 (tunE word 2031).
Automatic tuning is always active and analyses constantly the difference setpoint-process. If this difference is greater than the value selected on parameter 47 M.G.t. (Max Gap Tune - word 2047), the ISO-plus decides autonomously when to modify PID parameters.

7.4 Manual tuning

Select 2 on parameter 31 (tunE word 2031).
The manual procedure allows the user a greater flexibility on deciding when to update PID algorithm parameters.
This procedure is activated writing 1 on the word modbus 1205. The reference threshold to calculate the new PID parameters is given by the result of the following operation:
Tune threshold = **Setpoint** (word 1201) – **Par. 32** S.d.t. (word 2032)
Ex.: if setpoint is 100.0°C and Par. 32 S.d.t. is 20.0°C, the threshold to calculate PID parameters is (100.0–20.0) = 80.0°C.
N.B.: for greater accuracy in the calculation of PID parameters it is recommended to launch the manual tuning when the process is far from setpoint.

7.5 AutoTuning Launch "Once"

Set 3 on parameter 31 tunE (word 2031). Autotuning procedure is executed only once at next ISO-plus restart. If the procedure doesn't work, will be executed at next restart.

7.6 Synchronized tuning

Select 4 on parameter 31 (tunE word 2031).
This procedure has been conceived to calculate correct PID values on multi-zone systems, where each temperature is influenced by the adjacent zones.
Writing on word 1205, the device works as follows:

Word 1004 value	Action
0	Tune off.
1	Command output OFF
2	Command output ON
3	Tune active
4	Tune completed: command output OFF (read only)
5	Tune not available: softstart function enabled (only reading)

The operation of this Tuning mode is the following: the master switches-off or turns-on all zones (value 1 or 2 on word 1205) for a time long enough to create inertia on the system.
At this point the autotuning is launched (value 3 on word 1205). The controller calculates the new PID values. When the procedure ends, it switches-off the control output and sets the value 4 on word 1205. The master, which should always read the

word 1205, checks the various zones and when all of them have reached the value 4 it will bring to 0 the value of word 1205.
The various devices will regulate the temperature basing on the new values.
N.B. The master must read the Word 1205 at least every 10 seconds or the controller will automatically exit the autotuning procedure.

7.7 Automatic/Manual regulation for % output control

This function allows to select automatic functioning or manual command of the output percentage. With parameter 25 (Au.MA. word 2025), you can select two methods.

1. The first selection (value 1 of word 2025) allows to modify, through the word 1206, the functioning mode: after writing 1 it is possible to change the output percentage on word 1206 (range 0-10000).
   To return to automatic mode, write 0 on word 1206.
2. The second selection (value 2 of word 2025) enables the same functioning, but with two important variants:
   - If there is a temporary lack of voltage or after switch-off, the manual functioning will be maintained as well as the previously set output percentage value.
   - If the sensor breaks during automatic functioning, the controller moves to manual mode while maintaining the output percentage command unchanged as generated by the P.I.D. immediately before breakage.

7.8 Heater Break Alarm on CT (Current Transformer)

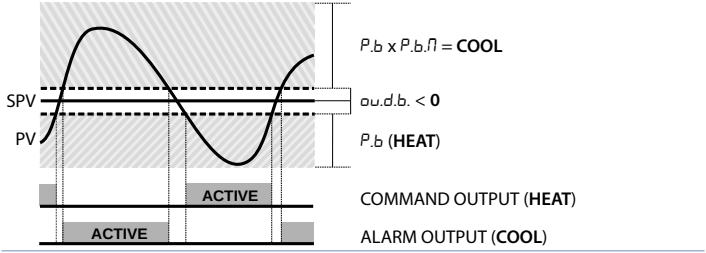
This function allows to measure load current to manage an alarm during a malfunctioning with power in short circuit, always open or partial break of the charge.
To enable this function set 1 (50 Hz) or 2 (60 Hz) on paramater 90 c.t. (word 2090). Set the value of the connected transfomer on parameter 91 c.t. u. (word 2091).

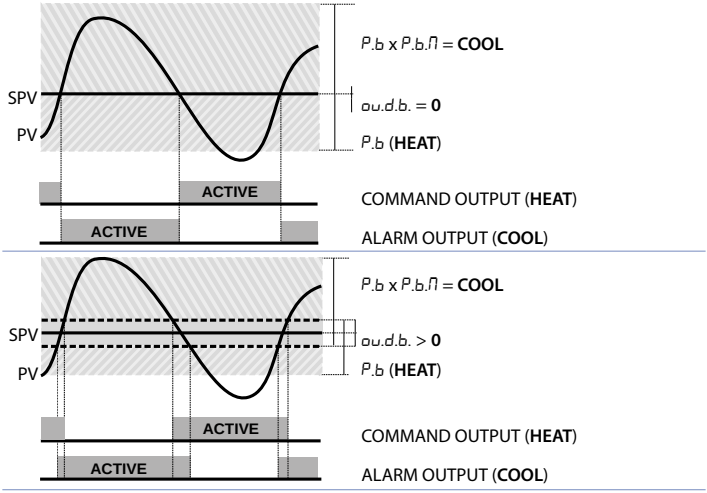
- Select on par. 92 H.b.A.t. the Heater Break Alarm intervention threshold in Ampere. Otherwise it is possible to select this value in automatic mode pressing ● for more than 3 seconds.
- Select on par. 94 H.b.A.d. the delay time in seconds for the Heater Break Alarm intervention.
- It is possible to associate the alarm to the output OUT2, selecting 10 on par. 56 AL. 1. or par. 68 AL. 2.

It is possible also to enable an overcurrent control, setting on parameter 93 ocu.t. the intervention threshold in Ampere.

7.9 Dual Action Heating-Cooling

This module is suitable also for systems requiring a combined heating-cooling action. The command output has to be configured as PID for Heating (par. 33 P.b. greater than 0), while the alarm 1 and 2 has to be configured as Cooling (value 9 on par. 56 AL. 1 o par. 68 AL. 2). The command output must be connected to the actuator responsible for heating, while the alarm will control cooling action.
Parameters to be configured for the heating PID are:
P.b. (word 2033): Heating proportional band
t.i. (word 2034): Integral time of heating and cooling
t.d. (word 2035): Derivative time of heating and cooling
t.c. (word 2040): Heating time cycle
Parameters to be configured for the cooling PID are:
AL. 1 (word 2056) or AL. 2 (word 2068) = cooL (value 9) Alarm selection (Cooling)
P.b.M. (word 2042): Proportional band multiplier
ou.d.b. (word 2043): Overlapping / Dead band
co.c.t. (word 2044): Cooling time cycle
Par. P.b.M. (that ranges from 1.00 to 5.00) determines the proportional band of cooling action basing on the formula:
Proportional band for cooling action = P.b. * P.b.M.
This gives a proportional band for cooling which will be the same as heating band if P.b.M. = 1.00, or 5 times greater if P.b.M. = 5.00.
Integral and derivative time are the same for both actions.
The par. ou.d.b. determines the percentage overlapping between the two actions. For systems in which the heating output and cooling output must never be simultaneously active a dead band (ou.d.b. ≤ 0) must be configured, vice versa you can configure an overlapping (ou.d.b. > 0).
The following figure shows an example of dual action P.I.D. (heating-cooling) with t.i. = 0 and t.d. = 0.





The parameter co.c.t. has the same meaning as the heating time cycle t.c.
Par. 41 coo.F. (Cooling Fluid – word 2041) pre-selects the proportional band multiplier P.b.M. and the cooling PID cycle time co.c.t. basing on the type of cooling fluid:

coo.F.	Cooling fluid type	P.b.M.	co.c.t.
Air	Air	1.00	10
oil	Oil	1.25	4
H2o	Water	2.50	2

Once selected the parameter coo.F., parameters P.b.M., ou.d.b and co.c.t. can however be modified.

7.10 Soft-Start function

ISO-plus is provided with two types of softstart selectables on parameter 80 SS.tY. ("Softstart Type" word 2080).

1 First selection (value 1 of word 2080) enables gradient softstart. At starting the controller reaches setpoint basing on the rising gradient set on parameter 81 SS.Gr. ("Softstart Gradient" word 2081) in Unit/hour (ex. °C/h). If parameter 84 SS.t 1. ("Softstart Time" word 2084) is different to 0, at starting when the time selected on parameter 84 is elapsed, the controller stops to follow the gradient and reaches setpoint with the maximum power.
2 Second selection (value 2 of word 2080) enables output percentual softstart. On par 83 SS.tH. ("Softstart Threshold" word 2083) it is possible to set the threshold under which starts the softstart. On parameter 82 SS.PE. ("Softstart Percentage" word 2082) an output percentage is selectable (0 to 100), which controller keeps until the process exceeds the threshold set on parameter 83 or until the time in minutes set on parameter 84 SS.t 1. ("Softstart Time" word 2084) expires.

7.11 Retransmission function on analogue output

If not used as command, the anaolgue output can be used to retransmit process/ setpoint/ current read by the C.T. input/ output percentage.
Select on parameter 100 rEtr. ("Retransmission" word 2100) the value to be retransmitted. Select on parameter 101 rE.tY. ("Retransmission Type" word 2101) the type of output. It is possible also to select on parameters 102 and 103 the input value rescale limites.

7.12 LATCH ON Function

For use with input P0t.1 (potentiometer 6 KΩ) and P0t.2 (potentiometer 150 KΩ) and with linear input (0..10 V, 0..60 mV, 0/4..20 mA), it is possible to associate start value of the scale (parameter 3 Lo.L. 1. "Lower Linear Input" word 2003) to the minimum position of the sensor and value of the scale end (parameter 4 uP.L. 1. "Upper Linear Input" word 2004) to the maximum position of the sensor (parameter 1 sul parametro 9 LtCh "Latch On" word 2009).
It is also possible to fix the point in which the controller will display 0 (however keeping the scale range between Lo.L. 1. e uP.L. 1.) using the "virtual zero" option by setting 2 or 3 in parameter 9 LtCh.
Setting 2 virtual zero can be modified in each moment while setting 1, Latch-On function ends after 120 seconds.
Then refer to the following table for the calibration procedure:

	Press	Display	Do
1	1300	Write 1 to enable Latch on. Write 0 to end procedure	Place the sensor on minimum operating value (corresponding to LoL.r)
2	1301	Write 1 to fix value on minimum	Place sensor on maximum operating value (corresponding to uPL.r)
3	1302	Write 1 to fix value on maximum	To exit standard procedure write 0 on 1300 or wait 120 seconds. With "virtual zero" put the sensor on zero point.
4	1303	Write 1 to fix zero virtual value. Write 2 to reset zero virtual value.	To exit procedure write 0 on word 1300.

7.13 Expansion function

Selecting 1 on parameter 121 E.Mod. ("Expansion Module" word 2121) it works as a expansion module. Controller functions (temperature control, alarms, softstart etc..) are disabled and outputs management must be done by an external master (Es. PLC, HMI panel...).
It is possible to configure output status at starting and in case of error, programming parameters 122...131 (see par. 9). Into this mode, refer to modbus words 1500..1508 (see par. 8).

8 Serial communication

The module xx-T128 is equipped with RS485 and can receive/broadcast data via serial communication using MODBUS RTU protocol. The device can only be configured as a Slave. This function enables the control of multiple controllers connected to a supervisory system/SCADA.
If contacts of dip-switch 1 are all open each controller responds to a Master query only if the query contains the same address as parameter 111 SL.Ad.("Slave Address" word 2111).
The addresses permitted range from 1 to 254 and there must not be controllers with the same address on the same line.
Address 255 can be used by the Master to communicate with all the connected equipment (broadcast mode), while with 0 all the devices receive the command, but no response is expected.

If Dip-Switch 2 contacts are opened, the baud rate is selected on parameter 112 bd.rt. ("Baud Rate" word 2112).
Module can introduce a delay (in milliseconds) of the response to the master request. This delay must be set on parameter 114 SE.dE. ("Serial Delay" word 2114).
Each parameter modification is saved by the controller in the EEPROM memory (100000 writing cycles), while the setpoints are saved with a delay of 10 seconds after the last modification.
NB: Changes made to words that are different from those reported in the following table can lead to malfunction.

Modbus RTU protocol features		
Baud-rate	Selectable on par. 112 bd.rt. Value 0: 4800bit/s Value 1: 9600bit/s Value 2: 19200bit/s Value 3: 28800bit/s	 Value 4: 38400bit/s Value 5: 57600bit/s Value 6: 115200bit/s
Format	Selectable on par. 113 S.P.P. Value 0: 8N1 Value 1: 8E1 Value 2: 8O1	 Value 3: 8N2 Value 4: 8E2 Value 5: 8O2
Supported functions	WORD READING (max 20 word) (0x03, 0x04) SINGLE WORD WRITING (0x06) MULTIPLE WORDS WRITING (max 20 word) (0x10)	

RO = Read Only R/W = Read/Write WO = Write Only

Modbus address	Descrizione	Read Write	Reset value
0	Type of device	RO	490
1	Software version	RO	Flash
2	Boot version	RO	Flash
3	Slave address	RO	Eepr/dip
6	Baud rate	RO	Eepr/dip
50	Automatic addressing	WO	-
51	Installation code comparision for automatic learning of slave address	WO	-
500	Loading default values (write 9999)	RW	0
501	Restart (write 9999)	RW	0
1000	Process (tenth of degree)	RO	-
1001	Command setpoint (tenth of degree)	R/W	EEPROM
1002	Alarm 1 setpoint (tenth of degree)	R/W	EEPROM
1003	Start/Stop 0=controller in STOP 1=controller in START	R/W	0

Modbus address	Descrizione	Read Write	Reset value
1004	With automatic tuning (word 2005 = 1): 0=autotuning function OFF 1=autotuning in progress	RO	0
	With manual tuning (word 2005 = 2): 0=autotuning function OFF 1=autotuning ON	R/W	0
	With synchronized tuning (word 2005 = 3): 0=autotuning function OFF 1=command out. OFF (forces the cooling) 2=command out. ON (forces the heating) 3=autotuning ON 4=autotuning completed	R/W	0
1005	Automatic/manual selection 0=automatic ; 1=manual	R/W	0
1006	Output status (0=off, 1=on) Bit 0 = OUT1 Bit 1 = OUT2	RO	0
1007	Led status (0 = OFF, 1 = ON) Bit0 = Green led Bit1 = Red led OUT1 Bit2 = Red led OUT2	RO	0
1008	Alarm status (0=absent, 1=present) Bit0 = Allarme 1 Bit1 = Allarme 2	RO	0
1009	Error flags Bit0 = Cold junction error Bit1 = Process error (sensor) Bit2 = Error in eeprom writing Bit3 = Error in eeprom reading Bit4 = Error missing calibration Bit5 = Generic error Bit6 = Hardware error Bit7 = Error H.B.A. (SSR in short circuit) Bit8 = Error H.B.A. (SSR/open charge) Bit9 = Error H.B.A. (partial break of the charge) Bit10= Overcurrent error	RO	0
1010	Cold junction temperature (degree with tenth)	RO	-
1011	Command output percentage (0-10000) Heating output percentage in double loop	R/W	0
1012	Cooling output percentage in double loop (0-10000)	RO	0
1013	Current CT (ampere with tenth)	RO	0
1014	Current CT ON (ampere with tenth)	RO	0

Modbus address	Descrizione	Read Write	Reset value
1015	Current CT OFF (ampere with tenth)	RO	0
1016	Key status (0=rilasciato, 1=premuto)	RO	0
1017	Dip 1 value	RO	0
1100	Process (if temperature, no tenth)	RO	-
1101	Command setpoint (if temperature, no tenth)	R/W	EEPROM
1102	Alarm 1 setpoint (if temperature, no tenth)	R/W	EEPROM
1103	Command output percentage (0-1000) Heating output percentage in double loop	R/W	0
1104	Heating output percentage (0-100) Heating output percentage in double loop	R/W	0
1105	Cooling output percentage in double loop (0-1000)	RO	0
1106	Cooling output percentage in double loop (0-100)	RO	0
1107	Output status (0=off, 1=on) Bit 0 = OUT1 Bit 1 = OUT2	RO	0
1108	Command output percentage (0-10000) Heating output percentage in doulbe loop	R/W	0
1200	Process (if temperature, with tenth)	RO	?
1201	Command setpoint (if temperature, with tenth)	R/W	EEPROM
1202	Alarm 1 setpoint (if temperature, with tenth)	R/W	EEPROM
1203	Alarm 2 setpoint (if temperature, with tenth)	R/W	EEPROM
1204	Start/Stop 0=controller in STOP 1=controller in START	R/W	0
1205	With automatic tuning (word 2005 = 1): 0=autotuning function OFF 1=autotuning in progress	RO	0
	With manual tuning (word 2005 = 2): 0=autotuning function OFF 1=autotuning ON	R/W	0
	With synchronized tuning (word 2005 = 3): 0=autotuning function OFF 1=command out. OFF (forces the cooling) 2=command out. ON (forces the heating) 3=autotuning ON 4=autotuning completed	R/W	0
1206	Automatic/manual selection 0=automatic ; 1=manual	R/W	0
1207	Real value (gradient) command setpoint (if temperature, with tenth)	R	-

Modbus address	Descrizione	Read Write	Reset value
1208	Alarm status (0=absent, 1=present) Bit0 = Allarme 1 Bit1 = Allarme 2	RO	0
1209	Command output manual reset: write 0 to reset command output. In reading 0=can not be reset, 1=can be reset	R/W	0
1210	Alarms manual reset: write 0 to reset all alarms. In reading 0=can not be reset, 1=can be reset Bit0 = Allarme 1 Bit1 = Allarme 2	R/W	0
1211	Remote alarm 1 state (0=absent, 1=present)	R/W	0
1212	Remote alarm 2 state (0=absent, 1=present)	R/W	0
1213	AO value by serial (Par.100 = 6)	R/W	0
1214	Error flags 1 Bit0 = Cold junction error Bit1 = Process error (sensor) Bit2 = Error in eeprom writing Bit3 = Error in eeprom reading Bit4 = Error missing calibration Bit5 = Generic error Bit6 = Hardware error Bit7 = Error H.B.A. (SSR in short circuit) Bit8 = Error H.B.A. (SSR/open charge) Bit9 = Error H.B.A. (partial break of the charge) Bit10= Overcurrent error	RO	0
1215	Error flags 2 Bit0 = Error eeprom calibrations Bit1 = Error eeprom calibration constants Bit2 = Error eeprom parameters Bit3 = Error eeprom setpoint Bit4 = Error eeprom service datas A Bit5 = Error eeprom service datas B Bit6 = Error eeprom service datas C	RO	0
1216	Command output percentage (0-10000) Heating output percentage in double loop	R/W	0
1217	Cooling output percentage in double loop (0-10000)	RO	0
1218	Command output percentage (0-1000) Heating output percentage in double loop	R/W	0
1219	Cooling output percentage in double loop (0-1000)	RO	0

Modbus address	Descrizione	Read Write	Reset value
1220	Command output percentage (0-100) Heating output percentage in double loop	R/W	0
1221	Cooling output percentage in double loop (0-100)	RO	0
1222	Current CT (ampere with tenth)	RO	0
1223	Current media CT (ampere with tenth)	RO	0
1224	Current CT ON (ampere with tenth)	RO	0
1225	Current CT OFF (ampere with tenth)	RO	0
1226	Cold junction temperature (degree with tenth)	RO	-
1227	Output status (0=off, 1=on) Bit 0 = OUT1 Bit 1 = OUT2	RO	0
1228	Led status (0 = OFF, 1 = ON) Bit0 = Green led Bit1 = Red led OUT1 Bit2 = Red led OUT2	RO	0
1229	Key status (0=rilasciato, 1=premuto)	RO	0
1230	Dip 1 value	RO	0
1231	Dip 2 value	RO	0
1232	Process (if temperature, no tenth)	RO	-
1233	Command setpoint (if temperature, no tenth)	R/W	EEPROM
1234	Alarm 1 Setpoint (if temperature, no tenth)	R/W	EEPROM
1235	Alarm 2 Setpoint (if temperature, no tenth)	R/W	EEPROM
1300	Latch on setting	R/W	0
1301	Latch on lower limit calibration	R/W	0
1302	Latch on upper limit calibration	R/W	0
1303	Latch on virtual zero calibration	R/W	0
1500	Process (if temperature, with tenth)	RO	?
1501	CT instantaneous current (ampere with tenth)	RO	0
1502	Current CT ON (ampere with tenth)	RO	0
1503	Current CT OFF (ampere with tenth)	RO	0
1504	Key status (0=rilasciato, 1=premuto)	RO	0
1505	Dip 1 value	RO	0
1506	Dip 2 value	RO	0
1507	Digital output status (0=off, 1=on) Bit 0 = OUT1 Bit 1 = OUT2	R/W	0
1508	Analogue output value	R/W	0
2001	Parameter 1	R/W	EEPROM
2002	Parameter 2	R/W	EEPROM
...	Parameter ...	R/W	EEPROM
2143	Parameter 143	R/W	EEPROM

9 Table of configuration parameters
9.1 GROUP A - ANALOGUE INPUT

1 SEn. Sensor (Word modbus 2001)

Analogue input configuration / sensor selection

0	Tc-K	-260 °C..1360 °C. (**Default**)
1	Tc-S	-40 °C..1760 °C
2	Tc-R	-40 °C..1760 °C
3	Tc-J	-200 °C..1200 °C
4	Tc-T	-260 °C..400 °C
5	Tc-E	-260 °C..980 °C
6	Tc-N	-260 °C..1280 °C
7	Tc-B	100 °C..1820 °C
8	Pt100	-100 °C..600 °C
9	Ni100	-60 °C..180 °C
10	NTC10K	-40 °C..125 °C
11	PTC1K	-50 °C..150 °C
12	Pt500	-100 °C..600 °C
13	Pt1000	-100 °C..600 °C
14	0..10 V	
15	0..20 mA	
16	4..20 mA	
17	0..60 mV	
18	Potenziometer (set the value on parameter 5)	

2 dEGr. Degree (Word modbus 2002)

0	°C	Centigrade (**Default**)
1	°F	Fahrenheit
2	K	Kelvin

3 Lo.L.i. Lower Linear Input (Word modbus 2003)

Range AN1 lower limit only for linear input. Ex: with input 4..20 mA this parameter takes value associated to 4 mA.
-32767..+32767, **Default**: 0.

4 uP.L.i. Upper Linear Input (Word modbus 2004)

Range AN1 upper limit only for linear input. Ex: with input 4..20 mA this parameter takes value associated to 20 mA.
-32767..+32767. **Default**:10000

5 Pot.u. Potentiometer Value (Word modbus 2005)

Select potentiometer value
1..150 kohm. **Default**: 10kohm

6 L.i.o.L. **Linear Input over Limits (Word modbus 2006)**

If linear input, allows process to go over limits (Par. 3 and 4).

0 Disabled (**Default**)
1 Enabled

7 o.cAL. **Offset Calibration (Word modbus 2007)**

Value added / subtracted to the process visualization (usually correcting the value of environmental temperature).
-10000..+10000 [digit[1]] (degrees.tenths for temperature sensors). **Default** 0.

8 G.cAL. **Gain Calibration (Word modbus 2008)**

Percentage value that is multiplied for the process value (allows to calibrated the working point). Ex: to correct the range from 0..1000°C showing 0..1010°C, set the par. to -1.0.
-1000 (100.0%)...+1000 (+100.0%), **Default**: 0.0.

9 Ltch **Latch-On (Word modbus 2009)**

Automatic setting of limits for linear inputs and potentiometers.

0 Disabled (**Default**)
1 Standard
2 Virtual zero
3 Linear virtual zero

10 FLtr. **Filter (Word modbus 2010)**

Analogue input reading filter: increases process stability on word 1000, 1100, 1200, 1232.
1...50. (**Default**: 1)

11÷15 Reserved Parameters - Group A

Reserved parameters - Group A

9.2 Group B - OUTPUT AND REGULATION

16 c.out Command Output (Word modbus 2016)

Command output type selection

0 Command Q1; Alarm 1 Q2; Alarm 2 AO (0..20 mA). (**Default**)
1 Command Q1; Alarm 1 Q2; Alarm 2 AO (4..20 mA).
2 Valve command: Q1 (open) - Q2 (close); Alarm 1 AO (0..20 mA)
3 Valve command: Q1 (open) - Q2 (close); Alarm 1 AO (4..20 mA)
4 Command AO (0...20 mA); Alarm 1 Q1; Allarme 2 Q2.
5 Command AO (4...20 mA); Alarm 1 Q1; Allarme 2 Q2.

	Comando	Allarme 1	Allarme 2
0	Q1	Q2	AO (0..20 mA)
1	Q1	Q2	AO (4..20 mA)
2	Q1(open),Q2(close)	AO (0..20 mA)	-
3	Q1(open),Q2(close)	AO (4..20 mA)	-
4	AO (0..20 mA)	Q1	Q2
5	AO (4..20 mA)	Q1	Q2

17 in it.S. Initial State (Word modbus 2017)

Selects controller status at starting.

0 Start (**Default**)
1 Stop
2 Stored. Backs the controller to the Start/Stop status existing before the switching-off.

18 Act.t. Action type (Word modbus 2018)

0 Heating (N.O.) (**Default**)
1 Cooling (N.C.)

19 c. HY. Command Hysteresis (Word modbus 2019)

Hysteresis in ON/OFF
-10000..+10000 [digit] (degrees.tenths for temperature sensors). **Default** 2.

20 c. S.E. Command State Error (Word modbus 2020)

State of contact for command output in case of error.

0 0 mA if command on AO. Open contact if command on Q1. Open valve if valve command. (**Default)**
1 4 mA if command on AO. Closed contact if command on Q1. Closed valve if valve command.
2 20 mA if command on AO. Open contact if command on Q1. Open valve if valve command.
3 21.5 mA if command on AO. Closed contact if command on Q1. Closed valve if valve command.

21 c. S.S. Command State Stop (Word modbus 2021)

State of contact for command output with controller in STOP

0 0 mA if command on AO. Open contact if command on Q1. Open valve if valve command. (**Default**)

1 4 mA if command on AO. Closed contact if command on Q1. Closed valve if valve command.

2 20 mA if command on AO. Open contact if command on Q1. Open valve if valve command.

3 21.5 mA if command on AO. Closed contact if command on Q1. Closed valve if valve command.

22 c. rE. Command Reset (Word modbus 2022)

Type of reset for state of command contact (always automatic in P.I.D. functioning)

0 Automatic reset (**Default**)

1 Manual reset (by word 1029)

2 Manual reset stored (keeps relay status also after an eventual power failure)

23 c. dE. Command Delay (Word modbus 2023)

Command delay (only in ON / OFF functioning).
-3600..+3600 seconds. **Default**: 0.
Negative: delay in switching off phase.
Positive: delay in activation phase.

24 uAL.t. Valve Time (Word modbus 2024)

Valve time.
1...300 seconds. **Default**: 60.

25 Au.MA. Automatic / Manual (Word modbus 2025)

Enable automatic / manual selection.

0 Disabled (**Default**)

1 Enabled

2 Enabled with memory

26÷30 Reserved Parameters - Group B

Reserved parameters - Group B

9.3 GROUP C - AUTOTUNING AND P.I.D.

31 tunE. Tune (Word modbus 2031)

Autotuning type selection.

0 Disabled. (**Default**)
1 Automatic. Calculation of P.I.D. parameters at starting and at command setpoint modification.
2 Manual (P.I.D. with automatic parameters calculation by word 1004 or 1205)
3 Once (P.I.D. with parameters calculation only once at starting)
4 Synchronized.

32 S.dtu. Setpoint Deviation Tune (Word modbus 2032)

Selects deviation from command setpoint as threshold used by manual tuning to calculate P.I.D. parameters.
0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 300.

33 P.b. Proportional Band (Word modbus 2033)

Process inertia in units
0 ON / OFF if also t.r. is equal to 0. (**Default**)
1...10000 [digit] (degrees.tenths for temperature sensors).

34 i.t. Integral Time (Word modbus 2034)

Process inertia in seconds.
0 (0.0s)...20000 (2000.0s) tenths of second (0 = Integral action disabled), **Default** 0

35 d.t. Derivative Time (Word modbus 2035)

NDerivative time. Normally ¼ of integral time.
0(0.0s)...10000(1000.0s) tenths of second (0 = Derivative action disabled), **Default** 0

36 d.b. Dead Band (Word modbus 2036)

Dead Band.
0...10000 [digit] (degrees.tenths for temperature sensors) (**Default**: 0)

37 P.b.c. Proportional Band Centered (Word modbus 2037)

Defines if the proportional band has to be centered on setpoint. In double loop functioning (heating/cooling) is always disabled.

0 Disabled. Band under (heating) or over (cooling) (**Default**)
1 Centered band

38 o.o.S. **Off Over Setpoint (Word modbus 2038)**

In P.I.D. functioning enables the command outoput switching off, when passing a specific threshold (setpoint + Par.37).

0 Disabled. (**Default**)
1 Enabled

39 oF.d.t. **Off Deviation Threshold (Word modbus 2039)**

Selects command setpoint deviation to calculate the intervention threshold of "Off Over Setpoint" function.
-10000...+10000 [digit] (degrees.tenths for temperature sensors) (**Default**: 0)

40 c.t. **Cycle Time (Word modbus 2040)**

Cycle time (for PID on teleruptor 15s ; for PID on SSR 2s.)
1-300 seconds (**Default**:15s)

41 coo.F **Cooling Fluid (Word modbus 2041)**

Type of refrigerant fluid for heating / cooling PID.
Enable cooling output on par. AL.1 or AL.2.

0 Air. (**Default**)
1 Oil
2 Water

42 P.b.M. **Proportional Band Multiplier (Word modbus 2042)**

Proportional band for cooling action is done by the value of par. 30 multiplied for this value.
100(1.00)...500(5.00). **Default**: 100(1.00)

43 ou.d.b. **Overlap / Dead Band (Word modbus 2043)**

Dead band combination for heating / cooling P.I.D.
-200(-20.0%)...500(50.0%)
Negative: dead band.
Positive: overlapping. **Default**: 0(0.0%)

44 co.c.t. **Cooling Cycle Time (Word modbus 2044)**

Cycle time for cooling output.
1-300 seconds (**Default**:10s)

45 L.L.o.P. **Lower Limit Output Percentage (Word modbus 2045)**

Selects min. value for command output percentage.
0%...100%, **Default**: 0%.

46 u.L.o.P. Upper Limit Output Percentage (Word modbus 2046)

Selects max. value for command output percentage.
0%...100%, **Default**: 100%.

47 M.G.t.u. Max Gap Tune (Word modbus 2047)

Selects the max. process-setpoint gap over that the automatic tuning recalculates PID parameters.
0-10000 [digit] (degrees.tenths for temperature sensors). **Default: 3**0

48 M.P.b. Minimum Proportional Band (Word modbus 2048)

Selects the min. proportional band value selectable by the automatic tuning.
0-10000 [digit] (degrees.tenths for temperature sensors). **Default: 5**0

49 MA.P.b. Maximum Proportional Band (Word modbus 2049)

Selects the max. proportional band value selectable by the automatic tuning.
0-10000 [digit] (degrees.tenths for temperature sensors). **Default: 50**0

50 M.i.t. Minimum Integral Time (Word modbus 2050)

Selects the min. integral time value selectable by the automatic tuning.
0 (0.0s)...10000 (1000.0s) seconds. **Default**: 400 (40.0s).

51÷55 Reserved Parameters - Group C

Reserved parameters - Group C

9.4 GROUP D - ALARM 1

56 AL.1 Alarm 1 (Word modbus 2056)

The alarm intervention is related to Alarm 1.

0	Disabled. (**Default**)
1	Absolute alarm (threshold) referred to process active above
2	Absolute alarm (threshold) referred to process active below
3	Band alarm
4	Upper deviation alarm
5	Lower deviation alarm
6	Absolute alarm referred to active setpoint above
7	Absolute alarm referred to active setpoint below
8	Status alarm (active in RUN / START)
9	Cold actuator auxiliary (Cold action in double loop)
10	Heater Break Alarm and Overcurrent Alarm
11	Sensor error. Active alarm in case of broken sensor.
12	Remote. Alarm enabled by word 1211

57 A1.S.o Alarm 1 State Output (Word modbus 2057)

Alarm 1 output contact and intervention type.

0	(N.O. Start) Normally open, active at start (**Default**)
1	(N.C. Start) Normally closed, active at start
2	(N.O. Threshold) Normally open, active on reaching alarm[1]
3	(N.C. Threshold) Normally closed, active on reaching alarm[1]

58 A.1.HY. Alarm 1 Hysteresis (Word modbus 2058)

-10000..+10000 [digit] (degrees.tenths for temperature sensors). **Default** 0.5.

59 A.1.S.E. Alarm 1 State Error (Word modbus 2059)

State of contact for alarm 1 output in case of error.

0	0 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2. **Default**
1	4 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
2	20 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2
3	21.5 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.

60 A.1.S.S. Alarm 1 State Stop (Word modbus 2060)

Alarm 1 output contact state with controller in STOP

0	0 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2. **Default**
1	4 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
2	20 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2
3	21.5 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
4	Active alarm in Stop

[1] *On activation, the output is inhibited if the controller is in alarm mode. Activates only if alarm condition reappers, after that it was restored.*

61 A1.rE. Alarm 1 Reset (Word modbus 2061)

Alarm 1 contact reset type.

0	Automatic reset (**Default**)
1	Manual reset (by word 1210)
2	Manual reset stored. (keeps relay status also after an eventual power failure)

62 A1.dE. Alarm 1 Delay (Word modbus 2062)

Alarm 1 Delay. -3600..+3600 seconds. **Default**: 0.
Negative: delay in alarm output phase.
Positive: delay in alarm entry phase.

63÷67 Reserved Parameters - Group D

Reserved parameters - Group D

9.5 GROUP E - ALARM 2

68 AL2 Alarm 2 (Word modbus 2068)

The alarm intervention is related to Alarm 2.

0	Disabled (**Default**)
1	Absolute alarm (threshold) referred to process active above
2	Absolute alarm (threshold) referred to process active below
3	Band alarm
4	Upper deviation alarm
5	Lower deviation alarm
6	Absolute alarm referred to active setpoint above
7	Absolute alarm referred to active setpoint below
8	Status alarm (active in RUN / START)
9	Cold actuator auxiliary (Cold action in double loop)
10	Heater Break Alarm and Overcurrent Alarm
11	Sensor error. Active alarm in case of broken sensor
12	Remote. Alarm enabled by word 1212

69 A.25.o Alarm 2 State Output (Word modbus 2069)

Alarm 2 output contact and intervention type.

0 (N.O. Start) Normally open, active at start (**Default**)
1 (N.C. Start) Normally closed, active at start
2 (N.O. Threshold) Normally open, active on reaching alarm[2]
3 (N.C. Threshold) Normally closed, active on reaching alarm[2]

70 A.2HY. Alarm 2 Hysteresis (Word modbus 2070)

Alarm 2 Hysteresis
-10000..+10000 [digit] (degrees.tenths for temperature sensors). **Default** 0.5.

71 A.25.E. Alarm 2 State Error (Word modbus 2071)

Contact status for alarm output 2 in case of error

0 0 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2. **Default**
1 4 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
2 20 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2
3 21.5 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.

72 A.25.S. Alarm 2 State Stop (Word modbus 2072)

Contact status for alarm output 2 with controller in STOP

0 0 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2. **Default**
1 4 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
2 20 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2
3 21.5 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
4 Active alarm in Stop

73 A2.rE. Alarm 2 Reset (Word modbus 2073)

Alarm 2 contact reset type.

0 Automatic reset (**Default**)
1 Manual reset (by word 1210)
2 Manual reset stored. (keeps relay status also after an eventual power failure)

74 A.2.dE. Alarm 2 Delay (Word modbus 2074)

Alarm 2 Delay. -3600..+9360 seconds. **Default**: 0.
Negative: delay in alarm output phase.
Positive: delay in alarm entry phase.

75÷79 Reserved Parameters - Group E

Reserved parameters - Group E

[2] *On activation, the output is inhibited if the controller is in alarm mode. Activates only if alarm condition reappers, after that it was restored.*

9.6 GROUP F - SOFT-START

80 SS.tY. Soft-Start Type (Word modbus 2080)

Enables and selects soft-start type

0 Disabled (**Default**)
1 Gradient
2 Percentage

81 SS.Gr. Soft-Start gradient (Word modbus 2081)

Rise / fall gradient for soft-start.
1..10000 Digit/hour (tenths of degree/hour if temperature). (**Default**: 1000)

82 SS.PE. Soft-Start Percentage (Word modbus 2082)

Value of the output percentage during Soft-start.
0..100%. (**Default**: 50%)

83 SS.tH. Soft-Start Threshold (Word modbus 2083)

Threshold under which the device enables percentage soft-start function, at starting.
-10000...10000 [digit] (degrees.tenths for temperature sensors) (**Default**: 1000)

84 SS.t r. Soft-Start Time (Word modbus 2084)

Max. softstart duration: if the process doesn't reach the threshold entered on parameter 50 within the selected time, the controller will start to regulate on setpoint value.

0 Disabled
1...1440 minutes. (**Default**: 15 minutes)

85÷89 Reserved Parameters - Group F

Reserved parameters - Group F

9.7 GROUP G - CURRENT TRANSFORMER

90 c.t. Current Transformer (Word modbus 2090)

Enables C.T. input and selects the net frequency

0	Disabled (**Default**)
1	50 Hz
2	60 Hz

91 c.t. u. Current Transformer Value (Word modbus 2091)

Selects amperometric transformer full-scale

1…200	Ampere (**Default**: 50)

92 H.b.A.t. Heater Break Alarm Threshold (Word modbus 2092)

Heater Break Alarm activation threshold

0	Alarm disabled. (**Default**)
0.1-200.0	Ampere.

93 ocu.t. Overcurrent Alarm Threshold (Word modbus 2093)

Overcurrent alarm threshold

0	Alarm disabled. (**Default**)
0.1-200.0	Ampere

94 H.b.A.d. Heater Break Alarm Delay (Word modbus 2094)

Delay for Heater Break Alarm and overcurrent alarm

0...3600 s. (**Default**: 60 s)

95÷99 Reserved Parameters - Group G

Reserved parameters - Group G

9.8 GROUP H - RETRANSMISSION

100 rEtr. Retransmission (Word modbus 2100)

Retransmission for output 0/4..20 mA. Parameters 98 and 99 define upper/lower limit of operating sequence

0 Disabled (**Default**)
1 Process
2 Command setpoint
3 Alarm 1 setpoint
4 Alarm 2 setpoint
5 Ampere from current transformer
6 Remote value retransmission (word 1213)

101 rE.tY. Retransmission Type (Word modbus 2101)

Select the type of Retransmission

0 0...20 mA
1 4...20 mA (**Default**)

102 Lo.L.r. Lower Limit Retransmission (Word modbus 2102)

Linear output lower limit range (value related to 0/4 mA)
-32767..+32767 [digit] (degrees for temperature sensors), **Default**: 0.

103 uP.L.r. Upper Limit Retransmission (Word modbus 2103)

Linear output upper limit range (value related to 20 mA)
-32767..+32767 [digit] (degrees for temperature sensors), **Default**: 10000.

104 rE.S.E. Retransmission State Error (Word modbus 2104)

Selects the value of the analogue output in Volt in case of error

0 0 mA (**Default**)
1 4 mA
2 20 mA
3 21.5 mA

105 rE.S.S. Retransmission State Stop (Word modbus 2105)

Defines the analogue output value with controller in STOP

0 0 mA (**Default**)
1 4 mA
2 20 mA
3 21.5 mA
4 Retransmission active in STOP

106÷110 Reserved Parameters - Group H

Reserved parameters - Group H

9.9 GROUP I - SERIALE

111 SL.Ad. Slave Address (Word modbus 2111)

Selects slave address for serial communication when all DIP 1 contacts are set on OFF

1...254. **Default**: 247.

112 bd.rt. Baud Rate (Word modbus 2112)

Selects slave address for serial communication when all DIP 2 contacts are set on OFF

0	4800 bit/s
1	9600 bit/s
2	19200 bit/s (**Default**)
3	28800 bit/s
4	38400 bit/s
5	57600 bit/s
6	115200 bit/s

113 S.P.P. Serial Port Parameters (Word modbus 2113)

Selects the type of format for the modbus RTU communication

0	8-N-1	8 bit, no parity, 1 stop bit (**Default**)
1	8-E-1	8 bit, even parity, 1 stop bit
2	8-O-1	8 bit, odd parity, 1 stop bit
3	8-N-2	8 bit, no parity, 2 stop bit
4	8-E-2	8 bit, even parity, 2 stop bit
5	8-O-2	8 bit, odd parity, 2 stop bit

114 SE.dE. Serial Delay (Word modbus 2114)

Selects the serial delay.

0...100 ms. **Default**: 0 ms.

115 oFF.L. Off Line (Word modbus 2115)

Selects the off-line time. If no communication is available within the selected time, the controller will switch-off the command output.

0	Offline disabled (**Default**)
1...6000	tenths of seconds (Es. 100 = 10.0 s)

116÷120 Reserved Parameters - Group I

Reserved parameters - Group I

9.10 GROUP J - EXPANSION

121 E.Mod. Expansion Module (Word modbus 2121)

Enables "Expansion module" mode

0 Disabled (**Default**)

1 Enabled

122 i.uA.o. Initial Value Output (Word modbus 2122)

Selects output state at starting

Bit 0 Q1 (0 = off; 1 = on) **Default**: 0

Bit 1 Q2 (0 = off; 1 = on) **Default**: 0

123 E.Mo.o. Error Mode Output (Word modbus 2123)

Defines if the output has to commute into a default state in case of error or off-line. If the error is eliminated, the output keeps the default state.

Bit 0 Q1 (0 = unvaried; 1 = commute) **Default**: 0

Bit 1 Q2 (0 = unvaried; 1 = commute) **Default**: 0

124 E.uA.o. Error Value Output (Word modbus 2124)

Defines values to be assumed by the outputs in case of error or off-line.

Bit 0 Q1 (0 = off; 1 = on) **Default**: 0

Bit 1 Q2 (0 = off; 1 = on) **Default**: 0

125 A.o.tY. Analogue Output Type (Word modbus 2125)

Select the type of Analogue Output

0 0...20 mA

1 4...20 mA (**Default**)

126 L.L.A.o. Lower Limit Analogue Output (Word modbus 2126)

Analogue output lower limit range (value related to 0/4 mA)

-32767..+32767 [digit] **Default**: 0.

127 u.L.A.o. Upper Limit Analogue Output (Word modbus 2127)

Analogue output upper limit range (value related to 20 mA)

-32767..+32767 [digit] **Default**: 10000.

128 i.u.A.o. Initial Value Analogue Output (Word modbus 2128)

Selects analogue output value at starting

-32767..+32767 [digit] **Default**: 0.

129 E.n.A.o. Error Mode Analogue Output (Word modbus 2129)

Defines if the analogue output has to commute to a default value in case of error or off-line. If the error is eliminated, the output keeps the default value

0 AO unvaried in case of error (**Default**)
1 AO commuted in case of error

130 E.u.A.o. Error Value Analogue Output (Word modbus 2130)

Defines the value assumed by the output in case of error or off-line
-32767..+32767 [digit] **Default**: 0.

131 C.t.o.u. Current Transformer Output (Word modbus 2131)

Defines digital output connected to the current transfomer

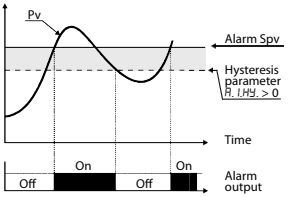
0 Q1 (**Default**)
1 Q2

132÷136 Reserved Parameters - Group J

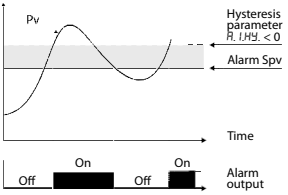
Reserved parameters - Group J

10 Alarm Intervention Modes

10.a Absolute Alarm or Threshold Alarm (word 2056 = 1)

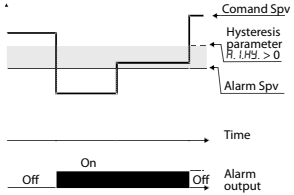


Absolute alarm. Hysteresis value greater than "0" (Par. 58 A. I.HY > 0).*



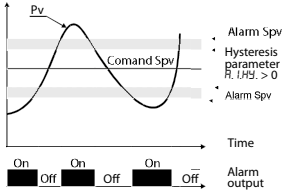
Absolute alarm. Hysteresis value less than "0" (Par. 58 A. I.HY > 0).*

10.b Allarme assoluto o allarme di soglia riferito al setpoint di comando attivo sopra (word 2056 = 6)

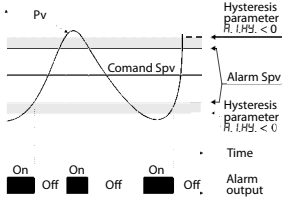


Absolute alarm referred to command setpoint.
Hysteresis value greater than "0"
(Par. 58 A. I.HY > 0).*
Command setpoint can be modified by RS485 (word 1201).

10.c Allarme di Banda (word 2056 = 3)



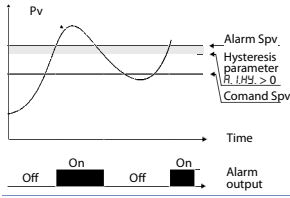
Band alarm hysteresis value greater than "0"
(Par.58 A. I.HY. > 0).*



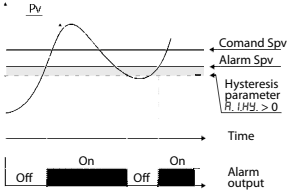
Band alarm hysteresis value less than "0"
(Par.58 A. I.HY. > 0).*

* *The example refers to alarm 1; the function can also be enabled for alarm 2.*

10.d Allarme di deviazione superiore (word 2056 = 4)

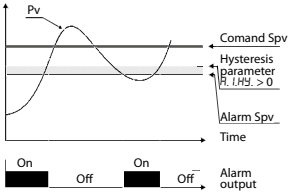


Upper deviation alarm value of alarm setpoint greater than “0” and hysteresis value greater than “0” (Par.58 A. I.HY. > 0).**

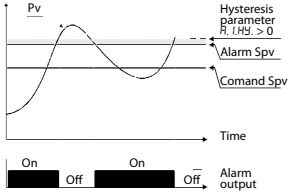


Upper deviation alarm value of alarm setpoint less than “0” and hysteresis value greater than “0” (Par.58 A. I.HY. > 0).**

10.e Allarme di deviazione inferiore (word 2056 = 5)



Lower deviation alarm value of alarm setpoint greater than “0” and hysteresis value greater than “0” (Par. 58 A. I.HY. > 0).***



Lower deviation alarm value of alarm setpoint less than “0” and hysteresis value greater than “0” (Par. 58 A. I.HY. > 0).***

*** a) The example refers to alarm 1; the function can also be enabled for alarm 2 .b) With hysteresis value less than “0” (A. I.HY. < 0) the dotted line moves over the alarm setpoint.*

**** With hysteresis value less than “0” (A. I.HY. < 0) the dotted line moves under the alarm setpoint.*

11 Table of Anomaly Signals

If installation malfunctions, the controller switches off the regulation output and reports the anomaly noticed on word 1009 (error flags).
For example, the controller will report a defective thermocouple by flashing alternately red/yellow LED and setting to 1 the bit 0 of the word 1009.
For other signals see table below:

	Cause	What to do
BIT2	Error in E^2PROM cell programming	Call Assistance
BIT0	Cold junction sensor fault or room temperature outside of allowed limits	Call Assistance
BIT3	Incorrect configuration data. Possible loss of calibration values	Check if the configuration parameters are correct
BIT1	Thermocouple open or temperature outside of limits	Check the connection with the sensors and their integrity
BIT4	Missing calibration data	Call Assistance

Notes / Updates

Table of configuration parameters

Read carefully the safety guidelines and programming instructions contained in this manual before using/connecting the device.

CE

RoHS Compliant

232- **RevA**

Software Rev.

0716